NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date:

Region: Fayetteville Regional Office
County: Montgomery
NC Facility ID: 6200015
Inspector's Name: Gregory Reeves
Date of Last Inspection: 05/31/2017
Compliance Code: 5 / Outstanding Penalty

Facility Data

Applicant (Facility's Name): Jordan Lumber & Supply Co.

Facility Address:
Jordan Lumber & Supply Co.
1939 Highway 109 South
Mount Gilead, NC 27306

SIC: 2421 / Sawmills & Planing Mills General
NAICS: 321912 / Cut Stock, Resawing Lumber, and Planing

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 02D .0515, 02D .0521, 02D .0516, 02D .0530, 02D .1111, and 02D .1806
NSPS: N/A
NESHAP: MACT DDDD
PSD: N/A
PSD Avoidance: N/A
NC Toxics:
112(r): N/A
Other: N/A

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Robert Jordan IV Vice President / General Manager (910) 439-8108 PO Box 98 Mt. Gilead, NC 27306	Robert Jordan IV Vice President / General Manager (910) 439-8108 PO Box 98 Mt. Gilead, NC 27306	Robert Jordan IV Vice President / General Manager (910) 439-8108 PO Box 98 Mt. Gilead, NC 27306

Application Data

Application Number: 6200015.17A, 6200015.17B
Date Received: 05/12/2017, 06/08/2017
Application Type: Modification
Application Schedule: TV-Sign-501(c)(2) Part II

Existing Permit Data
Existing Permit Number: 03469/T24
Existing Permit Issue Date: 08/31/2016
Existing Permit Expiration Date: 02/28/2021

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2015	5.47	52.25	490.51	51.20	50.06	43.01	22.86 [Methanol (methyl alcohol)]
2014	5.57	55.81	443.59	54.29	51.01	39.80	20.51 [Methanol (methyl alcohol)]
2013	6.53	66.92	429.43	64.86	74.59	40.23	19.72 [Methanol (methyl alcohol)]
2012	6.79	58.45	372.34	57.98	75.84	36.49	17.00 [Methanol (methyl alcohol)]
2011	6.49	55.93	311.37	152.55	71.04	31.47	14.59 [Methanol (methyl alcohol)]

Review Engineer: Betty Gatano

Review Engineer's Signature: **Date:**

Comments / Recommendations:
Issue 03469/T25
Permit Issue Date:
Permit Expiration Date:

1. Purpose of Application

Jordan Lumber & Supply, Co. (Jordan Lumber) currently holds Title V Permit No. 03469T24 with an expiration date of February 28, 2021 for a lumber mill in Mt. Gilead, Montgomery County, North Carolina. A permit application for "Part 2" significant modification under NCAC 02Q .0501(c)(2) was received on May 12, 2017.

Air Permit No. 03469T24 was issued to Jordan Lumber on August 31, 2016 to modify kiln 7 (ID No. K-7) from an indirect, steam-heated, batch lumber drying kiln to a direct, natural gas-fired, continuous lumber drying kiln. The modification was processed as a "Part 1" modification under 15A NCAC 02Q .0501(c)(2), and the facility was required to submit a Title V Air Quality Permit Application on or before 12 months after commencing operation. Kiln 7 commenced operation on May 15, 2016, and this permit requirement is fulfilled with the receipt of this permit application on May 12, 2017.

Emission limits for Best Available Control Technology (BACT) for the kilns (ID Nos. K-1 through K-8) were also updated under Air Permit No. 03469T24 and are addressed in this permit review.

A complete permit application for a minor modification (No. 6200015.17B) under 15A NCAC 02Q .0515 was received on June 9, 2017. Under the minor permit application, Jordan Lumber is requesting to add a wood-fired gasification system on kiln 7 (ID No. K-7), which will allow the kiln to function as a direct, wood-fired gasification, continuous lumber drying kiln. After the modification, kiln 7 can operate as either a direct, natural gas-fired kiln or a direct, gasified wood-fired kiln. The application for a minor modification will be consolidated and processed with the "Part 2" permit application.

The facility information contained in the permit application (Form A) was reviewed, and the permit and IBEAM were updated as necessary.

2. Facility Description

Jordan Lumber produces dimension lumber from green southern yellow pine. Southern yellow pine logs are trucked to the site and cut into lumber by one of the two sawmills. In the newer of the two sawmills (installed in 2010), the logs are debarked and then cut to specified lengths. The older sawmill operates essentially the same except it processes larger logs. The rough-cut lumber from the sawmills is stacked and dried in either the five steam-heated kilns (ID Nos. K-3 through K-6 and K-8), the two direct gasified wood-fired lumber kilns (ID Nos. K-1 and K-2), or the direct natural gas-fired continuous lumber kiln (ID No. K-7). The green lumber is dried in the kilns for 18-24 hours, depending on the initial moisture content, age, and size of the wood. The dried lumber is finished by planing and trimming in two planer mills (ID Nos. P01 and P02). Finished lumber is sorted by length, size, and grade; packaged; and then shipped off site.

Bark from the logs is sold to customers who subsequently process it into landscaping material. Scrap lumber is ground into chips and sold to the Unilin plant adjacent to the Jordan Lumber facility. The remaining green wood chips and planer shavings are sold and shipped off site as byproducts.

Steam for the steam-heated kilns (ID Nos. K-3 through K-6 and K-8) is provided by four wood-fired boilers (ID Nos. B01 through B04) and a natural gas-fired boiler (ID No. B05). The wood-fired boilers are fueled by hardwood bark brought in from chip mills. Jordan Lumber does not typically

burn any of the sawdust or bark from its own operations, as it is generally too wet to provide good boiler operations.

The facility currently has approximately 250 employees and operates its boilers and kilns 24 hours a day, seven days a week. The sawmills operate 8 hours per day, five days per week, or more often depending on business demands.

3. Application Chronology

May 12, 2017	Received permit application No. 6200015.17A for permit modification.
May 12, 2017	Sent acknowledgment letter indicating the application for permit modification was complete.
May 18, 2017	Greg Reeves of the Fayetteville Regional Office (FRO) provided comments on the renewal application.
June 8, 2017	Received permit application No. 6200015.17B for minor modification under 15A NCAC 02D .0515 to add a wood-fired gasification system on kiln 7 (ID No. K-7). The required "Form A1 – Minor" was not included with the permit application.
June 9, 2017	The required "Form A1 – Minor" was received.
June 9 – 23, 2017	Betty Gatano and Joe Sullivan, consultant for Jordan Lumber, and other DAQ staff had numerous conversations via phone call and e-mail regarding emissions from the wood-fired gasification system on kiln 7 (ID No. K-7). Eventually, it was determined the capacity for kiln 7 used in the "Part 1" permit application was not the maximum theoretical throughput. The DAQ requested Jordan Lumber to submit a letter stating the facility used projected actual emissions to avoid applicability to Prevention of Significant Deterioration under the "Part 1" application as allowed under 15A NCAC 02D .0530(u).
June 22, 2017	Greg Reeves of the FRO provided comments on permit application No. 6200015.17B for a minor modification.
June 26, 2017	Jordan Lumber submitted an amendment to the "Part 2" permit application acknowledging the maximum theoretical throughput of kiln 7 was not used in the "Part 1" permit. The amendment also requested requirements under 15A NCAC 02D .0530(u) be incorporated into the permit.
June 26, 2017	DAQ issued an acknowledgement letter allowing Jordan Lumber to implement the changes proposed in permit application No. 6200015.17B immediately, provided the facility complied with both the applicable requirements governing the changes and the proposed permit terms and monitoring, recordkeeping, and reporting conditions identified in the application.
July 25, 2017	Draft permit and permit review forwarded internally for comments.

August 1, 2017	Comments received from Mark Cuilla, Permitting Supervisor.
August 10, 2017	Draft permit and permit review forwarded to facility.
August 25, 2017	Greg Reeves of FRO indicated via e-mail that he had no comments on the draft permit and permit review.
August 30, 2017	Joe Sullivan indicated via e-mail that the facility had no comments on the draft permit and permit review.

4. Permit Modifications/Changes and TVEE Discussion

The following table describes the changes to the current permit as part of the modification.

Pages	Section	Description of Changes
Cover and throughout	--	Updated all dates and permit revision numbers.
3	Section 1.0 – Equipment Table	• Add gasified wood as a fuel for kiln 7 (ID No. K-7). The modified description for this kiln is "one direct gasified wood-fired/natural gas-fired continuous lumber kiln." • Removed footnote indicating kiln 7 (ID No. K-7) is listed as a 15A NCAC 02Q .0501(c)(2) modification. This permit requirement is fulfilled with the receipt of permit application no. 6200015.17A on May 12, 2017. • Added footnote stating "The Permittee shall not simultaneously fire natural gas and wood in the direct gasified wood-fired / natural gas-fired continuous lumber kiln (ID No. K-7)."
18	2.1 D – Regulations Table	• Add gasified wood as a fuel for kiln 7 (ID No. K-7). The modified description for this kiln is "one direct gasified wood-fired/natural gas-fired continuous lumber kiln." • Added footnote stating "The Permittee shall not simultaneously fire natural gas and wood in the direct gasified wood-fired / natural gas-fired continuous lumber kiln (ID No. K-7)."
19	2.1 D.1.d	Added a statement indicating no reporting is required for kilns (ID Nos. K-1, K-2, and K-7) under 15A NCAC 02D .0515.
--	2.1 D.5	Removed permit condition under 15A NCAC 02Q .0504, requiring the Permittee to submit a Title V Air Quality Permit Application on or before 12 months after commencing operation of kiln 7 (ID No. K-7). The kiln commenced operation on May 15, 2016, and this permit requirement is fulfilled with the receipt of permit application no. 6200015.17A on May 12, 2017.
20	2.1 D.5	Added permit condition for 15A NCAC 02D .0530(u).
28 – 38	3.0	Updated the General Conditions and the list of Acronyms with the most current version (Version 5.1 08/03/2017).

The emission description for kiln 7 (ID No. K-7) was changed in Title V Equipment Editor (TVEE) under this permit renewal. The revised description is as follows:

> *One direct gasified wood-fired/natural gas-fired continuous lumber kiln (30 million Btu per hour maximum heat input rate when operated as a direct gasified wood-fired kiln; 24 million Btu per hour maximum heat input rate when operated as a direct natural gas-fired kiln)*

5. "Part 2" Permit Application (No. 6200015.17A)

Emissions

Air Permit No. 03469T24 was issued to Jordan Lumber on August 31, 2016 to modify kiln 7 (ID No. K-7) from an indirect, steam-heated, batch lumber drying kiln to a direct, natural gas-fired, continuous lumber drying kiln. The maximum heat input of the natural gas-fired kiln is 24 million Btu/hr. The facility estimates the modification will increase the throughput capacity of the kiln by approximately 25 percent and has selected a projected throughput of 45,000,000 board feet of lumber per year.

As specified in the "Part 2" permit application, information for emission calculations was provided in the "Part 1" application submitted on April 18, 2016. Additional information for calculation of the emissions was provided in subsequent e-mails from the consultant for the "Part 1" permit application.

Modifying the kiln represents a physical change in or change in the method of operation. As such, the emissions resulting from the modification were reviewed to determine if this project would be considered a major modification under Prevention of Significant Deterioration (PSD) rules. Jordan Lumber assessed the applicability of PSD by performing the comparison test of baseline actual emissions (BAE) to projected actual emissions (PAE) from this project based on a throughput of 45,000,000 board feet per year from kiln 7. At the time of "Part 1" permit application, this throughput was thought to be the maximum theoretical throughput of kiln 7, but this assumption was not accurate. Jordan Lumber submitted an amendment to the "Part 2" permit application on June 26, 2017 acknowledging the maximum theoretical throughput of kiln 7 was not used in the "Part 1" permit. The amendment also requested requirements under 15A NCAC 02D .0530(u) be incorporated into the permit for tracking the PAE.

For the BAE, Jordan Lumber conducted a three-year look back at emissions from the kiln (ID No. K-7) as reported in DAQ's emission inventory. A three year look back is sufficient per DAQ's definition of BAE, which means the following:

> *For an existing emissions unit, baseline actual emissions mean the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during* ***any consecutive 24-month period*** *selected by the owner or operator within the five-year period immediately preceding the date that a complete permit application is received by the Division for a permit required under this Rule.* (emphasis added).

The 24-month average period of 2013 – 2014 was used as the baseline period for all air pollutants. Actual throughput rates for the kiln and emission factors as reported in DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007) were used to calculate the BAE. As a conservative assumption, emissions resulting from the steam requirements of the boilers were not accounted for in the BAE. The BAE calculations are provided in Attachment 1.

PAE from the modification were based on a projected throughput of 45,000,000 board feet per year (bf/yr) and the emission factors for "gasified" kilns in DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007). Calculation of PAE from wood drying in the natural gas-fired kiln are provided in Attachment 1. The PAE also included emissions from natural gas combustion using DAQ's "Natural Gas Combustion Emissions Calculator Revision M" (06/22/2015).

The comparison of the BAE and PAE emissions is provided in Table 1. Jordan Lumber is a major source under the PSD rules. For this modification to be considered a significant modification under PSD, the emissions increase must exceed the PSD significant emission rates (SER). As shown in the table below, the emission increases are less than the SER for all pollutants. Therefore, this project is not a major modification under PSD, and no PSD review is required.

Table 1 – PAE from Modification to Convert Kiln 7 to Direct, Natural Gas-Fired Continuous Kiln

Pollutant	BAE (tpy)	PAE Emissions (tpy)			Emission Increase (tpy)	PSD SER (tpy)	Below PSD SER
		Wood Drying in Kiln	Natural Gas Combustion	Total			
Total PM	0.32	3.15	0.78	3.93	3.61	25	Y
PM10						15	Y
PM2.5						10	Y
SO_2	--	--	0.06	0.06	0.06	40	Y
NO_x	--	--	10.3	10.3	10.3	40	Y
CO	--	--	8.7	8.7	8.7	100	Y
VOC	59.0	97.7	0.57	98.3	39.3	40	Y

Notes:

- Total PM, PM10, and PM2.5 were assumed to be equal, as a conservative assumption.
- The BAE were based on actual throughput of 27,839,026 bf/yr for kiln (ID No. K-7) averaged over the 24-month period of 2013 – 2014.
- PAE from drying wood in the kiln were based on kiln throughput of 45,000,000 bf/yr. Emissions were determined from DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007) for a "gasifier" kiln.
- Emissions from natural gas combustion were based on DAQ's "Natural Gas Combustion Emissions Calculator Revision M" (06/22/2015), a maximum heat input of 24 million Btu/hr, and 8,760 hours of operation.

A permit condition for 2D .0530(u) will be added to the permit under this modification. The condition will require ten years of tracking emissions from the kiln, because the "project involves increasing the emissions unit's design capacity or its potential to emit the regulated NSR pollutant." More discussion on 02D .0530(u) is provided in Section 8.

North Carolina G.S. 143-215.107(a) exempts certain emission sources subject to federal regulations – including sources subject to Maximum Achievable Control Technology (MACT) standards – from NC air toxics regulations provided their emissions do not "present an unacceptable risk to human health," in accordance with G.S. 143-215.107(b) as codified on May 1, 2014. Kiln 7 is subject to a MACT standard, and the DAQ conducted an evaluation of emissions from the modified kiln to ensure the modification posed no unacceptable risk to human health.

Potential emissions of several Toxic Air Pollutants (TAPs) will increase with the increased capacity of the modified kiln (ID No. K-7). As required under 15A NCAC 02Q .0706, a facility-wide evaluation is required for any TAP having a net increase in emission or ambient concentration after modification.

The net increase must account for increases in emissions from the modified kiln as well as any emission changes from the reduced steam production in the boilers. For simplicity and as a

conservative assumption, steam production for kiln 7 was assumed only to result from the wood fired boilers (ID Nos. B01 through B04). The emission changes with the conversion of kiln 7 are provided in the table below. Attachment 2 provides detailed emission calculations of actual emissions from kiln 7, and calculation of potential emissions are discussed previously.

Table 2 – Net Increase in TAP Emissions after Modification

Pollutant	Actual Emissions prior to Modification (lb/yr)	Projected Emissions after Modification (lb/yr)	Net Increase in Emissions (lb/yr)
Acetaldehyde	1623.8	2340	716.2
Acrolein	688.3	337.5	-350.8
Ammonia	--	659.6	659.6
Benzene	502.3	0.4	-501.8
Benzo(a)pyrene	0.3	0.0	-0.3
Formaldehyde	1038.1	4635.0	3612.4
Hexane, n-	--	371.0	371.0
Phenol	302.0	450.0	148.0
Toluene	110.0	0.7	-109.3

Notes:

- Ammonia and hexane are associated with the combustion of natural gas.
- All steam heated kilns (ID Nos. K-1 through K-8) were grouped together in DAQ's emission inventory. Therefore, the actual emissions from kiln 7 were based on actual throughput in 2013 and 2014 used as input in DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007). Hourly TAP emissions were calculated assuming a 24-hour batch cycle.
- Actual emissions from wood combustion in the boilers were calculated using DAQ's "Woodwaste Combustion Emission Calculator Revision J" (07/15/11) and an estimated heat input based on calculated drying factor.
- Projected emissions after modification were based on a throughput of 45,000,000 bf/yr used as input in DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007). Hourly TAP emissions were calculated assuming continuous operation of 24 hours per day.
- Potential emissions from natural gas combustion were based on DAQ's "Natural Gas Combustion Emissions Calculator Revision M" (06/22/2015), a maximum heat input of 24 million Btu/hr and 8,760 hours of operation.

Emissions of benzene, benzo(a)pyrene, and toluene result in a net reduction in emissions after modification. Emissions of these TAPs are result from the wood-fired boilers (ID Nos. B01 through B04). Because the emissions are reduced and the dispersion parameters of the boilers will not change, the ambient air concentrations of these TAPs are not expected to increase after modification. Thus, emissions of benzene, benzo(a)pyrene, and toluene do not pose an unacceptable risk to human health after modification, and no additional action is required for these TAPs.

Emissions of acrolein also result in a net reduction after modification. Approximately 65% of emissions of acrolein prior to modification result from the wood-fired boilers, while the remaining results from emissions from the kiln. The dispersion parameters from the boilers will not change as noted above, and the dispersion parameters from the modified kiln are not expected to increase the ambient air concentration of acrolein after modification, given the emission reduction. Thus, emissions of acrolein do not pose an unacceptable risk to human health after modification, and no additional action is required for this TAP.

Ammonia, acetaldehyde, formaldehyde, hexane, and phenol show a net increase in emissions after modification. The highest annual actual emissions of these TAPs over the past five years as reported

in the DAQ emission inventory were added to the potential emissions from the converted kiln for the NC air toxics evaluation. The results were then compared with the Toxics Permitting Emission Rate (TPER). As shown in the table below, emissions of formaldehyde and phenol exceed their TPER after modification, and emissions from these TAPs were investigated further.

Table 3 – Facility-Wide TAP Emissions after Modification

TAP	Facility-Wide Actual Emissions		Potential Emissions from Modification (lb/hr)	Total Emissions		TPER	
	(lb/yr)	(lb/hr)		(lb/hr)	(lb/day)	(lb/hr)	(lb/day)
Acetaldehyde	12,630.42	1.44	2.7E-1	1.71		6.8	
Ammonia	276.99	0.03	7.5E-02	0.11	--	0.68	
Formaldehyde	9,207.17	1.05	5.3E-01	1.6	--	0.04	
Hexane, n-	155.81	0.02	4.2E-02	0.06	1.44		23
Phenol	2,381.6	0.27	5.1E-02	0.32	--	0.24	

Notes:
- Highest actual emissions of formaldehyde occurred in calendar year 2014, as reported in the DAQ emission inventory. Hourly emissions calculated assuming 8,760 hours of operation.
- Highest actual emissions of all other pollutants occurred in calendar year 2015, as reported in the DAQ emission inventory. Hourly emissions calculated assuming 8,760 hours of operation.
- Potential emissions from modified kiln 7 include emissions from drying wood and from natural gas combustion, as discussed in Table 2 above.

In the next step in the NC air toxics evaluation, emissions of formaldehyde and phenol were compared with previously modeled emissions to determine if this modification poses an unacceptable risk to human health. Total emissions of formaldehyde and phenol (Facility-Wide Actual + Potential) are less than the total emissions used in the 2005 modeling. Given the margin of compliance of the previous modeling, the increased emissions in phenol and formaldehyde from the converted kiln do not pose an unacceptable risk to human health.

Table 4 – Comparison of Emissions to Modeled Emissions

TAP	2005 Modeling Results		Total Emissions after modification (Facility-wide Actual + Potential) (lb/hr)
	Total Modeled Emissions (lb/hr)	% of the AAL	
Formaldehyde	2.172	30%	1.6
Phenol	1.131	3%	0.32

Notes:
Air modeling was approved by Tom Anderson, meteorologist with the Air Quality Analysis Branch of the DAQ, in a memorandum dated September 15, 2005.

Modification of BACT Limits

On April 11, 2005, Jordan Lumber submitted a PSD permit application to install a new steam-heated drying kiln (ID No. K-8) and a new natural gas/landfill gas fired boiler (ID No. B05) and to convert two existing steam-heated drying kilns to direct wood-fired drying kilns (ID Nos. K-1 and K-2). The modification resulted in VOC emissions greater than the PSD significance levels. As part of that permit modification, Jordan Lumber also requested to remove the existing PSD avoidance limits for VOC, which required a PSD review of all existing kilns (ID Nos. K-3 through K-7) at the facility.

The BACT analysis demonstrated the emission limits in Table 5 below were BACT for the kilns with no associated controls. The BACT limits were added to Air Permit No. 03469T15 issued on November 7, 2005.

Table 5 – Previous BACT Limits

Emission Source	Pollutant	BACT Limit	Proposed Control
Steam-heated Lumber Kiln (ID Nos. K-3 through K-8)	VOC	3.97 lb VOC/1,000 bf, as pinene	No control
Gasified Lumber Kilns (ID Nos. K-1 and K-2)	VOC	4.29 lb VOC/1,000 bf, as pinene	No control

The BACT limits reflected the DAQ approved emission factors for kilns at that time. In July 2007, the DAQ revised VOC emissions factors for kilns in its "Wood Kiln Emissions Calculator Revision C" based an analysis of NCASI[1] and EPA data.

On June 21, 2016, Jordan Lumber submitted an amendment to Application No. 6200015.16B requesting the BACT limits in the permit be revised to reflect the DAQ's current VOC emission factors for kilns. Although the EPA has no final agency policy on revising BACT limits, Region 10 EPA guidance[2] provides three criteria in determining whether a BACT limit can be revised, as provided below:

1) The source was constructed in conformity with the permit.
2) The permitted BACT limits are inappropriate as a result of errors, faulty data, or incorrect assumptions contained in the permit application; and
3) The source investigated all available options to reduce emissions and demonstrated that compliance cannot be achieved.

For the existing kilns (ID Nos. K-1 through K-7), Jordan Lumber has met all three criteria. The existing kilns were constructed in conformity with their permit. The existing BACT limits are inappropriate now because updated DAQ emission factors differ from emission factors used in the PSD permit application. Lastly, the facility has no available options to reduce emissions because the kilns require no control under BACT. Compliance with the BACT limits is demonstrated via recordkeeping of the amount and species of wood dried in each kiln and applying the appropriate emission factor. Because all the criteria are met, DAQ deems it appropriate to modify the BACT emission limits for the existing kilns.

Kiln 8 has not yet been constructed, but as with the existing kilns, the BACT limit for kiln 8 is inappropriate because updated DAQ emission factors differ from emission factors used in the PSD permit application. Thus, DAQ deems it appropriate to modify the BACT emission limit for kiln 8.

The revised BACT emission factors are provided in the following table, and these BACT limits were updated under the "Part 1" permit modification with the issuance of Air Permit No. 03469T24.

[1] The National Council for Air and Stream Improvement (NCASI) is an independent, non-profit research institute that focuses on environmental topics of interest to the forest products industry.
[2] Kelly, Kate. "Revising NOx BACT Emission Limit at Simpson Tacoma Kraft." March 3, 2014.

Table 6 – Updated BACT Limits

Emission Source	Pollutant	BACT Limit	Proposed Control
Steam-heated Lumber Kiln (ID Nos. K-3 through K-6 and K-8)	VOC	4.09 lb VOC/1,000 bf, as pinene	No control
Gasified Lumber Kilns (ID Nos. K-1, K-2, and K-7)	VOC	4.34 lb VOC/1,000 bf, as pinene	No control
Notes: Emission factors for the gasifier kiln in DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007) were assumed representative of emissions from the direct natural-gas fired kiln (ID No. K-7).			

No change to the BACT limits for the kilns are required under the "Part 2" modification or the minor modification.

Regulatory Review
The regulatory review for this permit application is provided in Section 7 below.

6. Minor Modification Application (No. 6200015.17B)

Kiln 7 at Jordan lumber is a direct natural gas-fired continuous lumber kiln with a 24 million Btu per hour maximum heat input rate and a projected throughput of lumber of 45,000,000 board feet per year. Under the minor permit modification, Jordan Lumber is proposing to add a wood-fired gasification system on kiln 7 (ID No. K-7), which will utilize excess wood residuals (wet sawdust and planer shavings) from the production process as fuel. The heat input of the proposed gasification unit is 30 million Btu per hour, and the projected throughput of the kiln will remain the same at 45,000,000 board feet per year. After the modification, kiln 7 can operate as either a direct, natural gas-fired kiln or a direct, gasified wood-fired kiln.

The proposed combustion system is a wood gasification unit in which carbon in partially oxidized to carbon monoxide. The partial oxidation evolves heat and drives off combustible volatiles in the wood. The heated gasified stream combusts in a burner when additional oxygen is introduced into the system. The combusted gas is mixed with recirculated air to lower the temperature, and it is then blown directly into the kiln to the dry the lumber. The wood-fired gasifier cannot be fired simultaneously with the natural gas-fired burner.

When kiln 7 was modified to convert it from a steam heated batch kiln to a direct, natural gas-fired continuous lumber kiln and to increase the throughput to 45,000,000 board feet per year under Air Permit No. 03469T42, emissions of volatile organic compounds (VOCs) and particulate matter (PM) from the kiln were determined using the "gasifier" kiln in DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007). Emissions of these pollutants will remain the same for the addition of the wood-fired gasification unit because the same assumptions were used in DAQ's kiln spreadsheet. However, emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x) and carbon monoxide (CO), which are not addressed in DAQ's kiln spreadsheet, will differ.

When kiln 7 was converted to a direct, natural gas-fired continuous lumber drying kiln, emissions of SO_2, NO_x, and CO were estimated using DAQ's "Natural Gas Combustion Emissions Calculator Revision M" (06/22/2015). For the wood-fired gasifier, emissions of these pollutants were estimated from DAQ's "Woodwaste Combustion Calculator Revision K" (March 8, 2017). A stoker boiler having a heat input of 30 million Btu per hour was used in the spreadsheet. Additionally, the boiler

was assumed to fire 80% wet wood and 20% dry wood by weight. This percentage is a conservative assumption based on past emission inventories for boilers at the facility.

Adding the wood gasifier represents a physical change in or change in the method of operation of the kiln. As such, the emissions resulting from the modification were reviewed to determine if this project would be considered a major modification under PSD rules. Jordan Lumber is a major source under the PSD rules. For this modification to be considered a significant modification under PSD, the emissions increase must exceed the SER under PSD. As noted above in Section 5, Jordan Lumber used the 24-month period of 2013 – 2014 for its BAE. PAE emissions were based on the projected throughput of 45,000,000 bf per year. The comparison of PAE to BAE is provided in Table 7, and as shown in the table, emissions for all PSD pollutants are below their SERs. Therefore, this project is not a major modification under PSD, and a PSD review is not required for the addition of the direct, wood-fired gasifier.

Table 7 – PAE from Modification to Add the Direct, Wood-fired Gasifier

Pollutant	BAE (tpy)	PAE Emissions (tpy)	Emission Increase (tpy)	PSD SER (tpy)	Below PSD SER
Total PM	0.32	3.15	2.83	25	Y
PM10				15	Y
PM2.5				10	Y
SO_2	--	3.3	3.3	40	Y
NO_x	--	36.0	36.0	40	Y
CO	--	78.8	78.8	100	Y
VOC	59.0	97.7	38.7	40	Y

Notes:

- Total PM, PM10, and PM2.5 were assumed to be equal, as a conservative assumption.
- The BAE were based on actual throughput of 27,839,026 bf/yr for kiln (ID No. K-7) averaged over the 24-month period of 2013 – 2014.
- PAE from drying wood in the kiln were based on kiln throughput of 45,000,000 bf/yr.
- Emission of VOC and PM were determined from DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007) for a "gasifier" kiln.
- Emissions of SO_2 and CO were determined from DAQ's "Woodwaste Combustion Calculator Revision K" (03/08/2017), using a stoker boiler with heat input was 30 million Btu/hr.
- Emissions of NO_x, were determined from DAQ's "Woodwaste Combustion Calculator Revision K" (03/08/2017), using a stoker boiler with heat input was 30 million Btu/hr. Because emissions of NO_x are affected by the moisture of wood burned, the type of wood was assumed to be 80% wet wood and 20% dry wood by weight. This percentage is a conservative estimated based on past emission inventories for boilers at the facility. The resulting emissions of NO_x were determined as follows:

  Emission of NO_x burning 100% wet wood = 28.91 tpy
  Emission of NO_x burning 100% dry wood = 64.39 tpy
  Emission of NO_x = (28.91 tpy)*0.8 + (64.93 tpy)*0.2
  Emission of NO_x = 36.0 tpy

A permit condition for 2D .0530(u) will be added to the permit under this modification for this project. More discussion on 02D .0530(u) is provided in Section 8.

As noted previously North Carolina G.S. 143-215.107(a) exempts MACT standards from NC air toxics regulations provided their emissions do not "present an unacceptable risk to human health," in accordance with G.S. 143-215. 107(b) as codified on May 1, 2014. The DAQ conducted an evaluation of emissions from the modified kiln when kiln 7 was converted to a direct, natural gas-

fired continuous lumber drying kiln under Air Permit No. 03469T24. The evaluation, which is discussed in Section 5 above, was conducted using emissions of Toxic Air Pollutants (TAPs) calculated with DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007) for a gasifier kiln. The evaluation demonstrated the conversion to direct, natural gas-fired kiln did not pose an unacceptable risk to human health. This evaluation remains valid for the current modification to add wood-fired gasifier to the kiln. Thus, the addition of the direct, wood-fired gasifier does not pose an unacceptable risk to human health.

Regulatory Review
The regulatory review for this permit application is provided in Section 7 below.

7. Regulatory Review

The direct gasified wood-fired/natural gas-fired continuous lumber kiln (ID No. K-7) is subject to regulations discussed in this section.

- 15A NCAC 02D .0515, Particulates from Miscellaneous Industrial Processes – The kiln is subject to 02D .0515. Allowable emissions of PM are calculated from the following equation, for process weight rates up to 30 tons/hr:

  $E = 4.10(P)^{0.67}$

  Where E = allowable emission rate in pounds per hour
  P = process weight in tons per hour

  The process weight (P) and allowable emissions (E) are estimated as follows:

Measure	Value	Source
Throughput of lumber	5,137 bf/hr 428 ft^3/hr	Assuming a projected throughput of 45,000,000 bf/yr and continuous operations. A board foot is actually a measure of volume. By definition a board foot is one square foot one inch thick. 1 bf = 144 in^3 = 0.0833 ft^3
Density of lumber	53 lb/ft^3	Maximum density for fresh, southern yellow pine Reference for properties of wood species at http://www.engineeringtoolbox.com/weigt-wood-d_821.html
Process Weight	P = Max throughput (ft^3/hr)* Density (lb/ft^3)*Conversion factor (ton/lb) P = (428 ft^3/hr) (53 lb/ft^3) (ton/2000 lb) P = 11.3 tons/hr	
Allowable PM Emissions	E = $4.10(P)^{0.67}$ E = $4.10(11.3 \text{ ton/hr})^{0.67}$ E = 20.9 10 lb/hr	

  PAE of PM from kiln 7 are 3.61 tons/yr or 0.82 lbs/hr when firing natural gas and 3.15 tons/yr or 0.72 lb/hr when firing gasified wood, as reported previously in Tables 1 and 7, respectively. Both fuels result in emissions much less than the allowable PM emissions. The facility is required to maintain production records of lumber dried in kiln (ID No. K-7). No other

monitoring, recordkeeping, or reporting is required to demonstrate compliance with this particulate matter standard. Continued compliance is anticipated.

- 15A NCAC 02D .0516, Sulfur Dioxide from Combustion Sources – No monitoring, recordkeeping, or reporting is required when firing natural gas or wood in the kiln because of the low sulfur content of these fuels. Natural gas and wood are inherently low enough in sulfur that continued compliance is expected.

- 15A NCAC 02D .0521, Control of Visible Emissions – Kiln 7 (ID No. K-7) was manufactured after July 1, 1971 and must not have visible emissions of more than 20 percent opacity when averaged over a six-minute period, except as specified in 15A NCAC 02D .0521(d). No monitoring, recordkeeping, or reporting is required to demonstrate compliance with 02D .0521. Continued compliance is anticipated.

- 15A NCAC 02D .0530, Prevention of Significant Deterioration – Kiln7 (ID No. K-7) was subject to a BACT limit resulting from a prior modification, and it remains subject after conversion to a direct gasified wood-fired/natural gas-fired continuous lumber kiln. More discussion on PSD and BACT is provided in Section 8.

- 15A NCAC 02D .0530(u) – Jordan Lumber used PAE to demonstrate the modifications to convert the batch, steam-heated kiln (ID No. K-7) to a direct gasified wood-fired/natural gas-fired continuous lumber kiln was not a major modification under PSD. As such, the modifications are subject to recordkeeping and reporting requirements under 02D .0530(u). More discussion on PSD is provided in Section 8.

- 15A NCAC 02D .1111, Maximum Achievable Control Technology (MACT) – Kiln 7 (ID No. K-7) is subject to the "NESHAP for Plywood and Composite Wood Products," 40 CFR Part 63 Subpart DDDD. The modification to convert this kiln to a direct natural-gas fired kiln/ gasifier kiln was less than 50 percent of the fixed capital cost of constructing a new kiln. As such, the conversion to a direct, natural gas-fired/gasifier continuous lumber kiln does not meet the definition of reconstruction under the MACT, and the kiln remains classified as an existing kiln under 40 CFR Part 63 Subpart DDDD.

  Per 40 CFR 63.2252, lumber kilns and other process units not subject to the compliance options under 40 CFRR 63.2240 are not required to comply with the provisions of 40 CFR Part 63 Subpart DDDD or Subpart A, except for the initial notification requirements. The facility has previously submitted initial notifications for its existing kilns, and no further action is needed under the "Part 2" modification or minor modification.

- 15A NCAC 02D .1806, Control and Prohibition of Odorous Emissions – This condition is applicable facility-wide and is state enforceable only. No changes are needed under the "Part 2" permit modification or minor modification, and continued compliance is anticipated.

8. NSPS, NESHAPS/MACT, NSR/PSD, 112(r), CAM

NSPS

The four wood-fired boilers (ID Nos. B01 through B04) and the natural gas-fired boiler (ID No. B05) are subject to the NSPS for Small Industrial, Commercial, Institutional Steam Generating Units, 40 CFR Part 60 Subpart Dc. The "Part 2" modification and minor modification do not affect the NSPS

status of the boilers, and no changes to the permit are required. Continued compliance is anticipated.

NESHAPS/MACT

Jordan Lumber is major for hazardous air pollutants (HAPs) and is subject to the MACTs discussed in this section.

Case-by-Case MACT

The Case-by-Case MACT requirements for the wood-fired boilers (ID Nos. B01 through B04) were added to the permit under Air Permit No. 03469T20 issued on March 10, 2011, with a compliance date of March 10, 2014. The "Part 2" modification and minor modification do not affect the MACT status of the boilers, and no changes to the permit are required. Continued compliance is anticipated.

MACT Subpart DDDDD

The wood-fired boilers (ID Nos. B01 through B04) will be subject to the "NESHAP for Major Sources: Industrial, Commercial, and Institutional Boilers," 40 CFR Part 63 Subpart DDDDD beginning on May 20, 2019. The "Part 2" modification and minor modification do not affect the MACT status of the boilers, and no changes to the permit are required. Continued compliance is anticipated.

The natural gas-fired boilers (ID No. B05) is currently subject to 40 CFR Part 63 Subpart DDDDD as a new boiler. The "Part 2" modification and minor modifications do not affect the MACT status of this boiler, and no changes to the permit are required. Continued compliance is anticipated.

MACT Subpart DDDD

The direct gasified wood-fired lumber kilns (ID Nos. K-1 and K-2), the five steam-heated lumber kilns (ID Nos. K-3 through K-6 and K-8), and the direct gasified wood-fired/natural gas-fired continuous lumber kiln (ID No. K-7) are subject to the "NESHAP for Plywood and Composite Wood Products," 40 CFR Part 63 Subpart DDDD. The only requirement under MACT Subpart DDDD for these emission sources is an initial notification, which has been submitted for all kilns except for the steam-heated drying kiln (ID No. K-8). This kiln has not yet been installed, and initial notification is required within 15 days of startup. Continued compliance is anticipated.

MACT Subpart ZZZZ

The LPG-fired emergency generator (ID No. I-EG) is subject to the "NESHAP for Stationary Reciprocating Internal Combustion Engines," 40 CFR Part 63 Subpart ZZZZ. The "Part 2" modification and minor modification do not affect the MACT status of the generator, and no changes to the permit are required. Continued compliance is anticipated.

PSD

The facility is a PSD major source for VOC, with actual emissions greater than 250 tons per consecutive 12-month period. Requirements under PSD are discussed in this section.

Existing BACT Limits

Jordan Lumber is subject to BACT emission limits for each of its eight lumber drying kilns (ID Nos. K-1 through K-8). Specifically, kilns 3 through 8 were subject to a VOC emission rate of less than 3.97 pounds per thousand board feet, as pinene, for steam-heated lumber kilns. Kilns 1 and 2 were subject to a VOC emission rate of less than 4.29 pounds per thousand board feet, as pinene, for direct gasified lumber kilns. These conditions were placed into the permit as part of a

PSD modification for the construction of a steam-heated drying kiln and a natural gas/landfill gas fired boiler in November 2005. The preliminary BACT determination for Jordan Lumber provides more details about these BACT limits.[3]

As noted above in Section 5, the BACT limits were updated under Air Permit No. 03469T24 to reflect the currently accepted emission factors for kilns specified in DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007). No changes are needed under the "Part 2" permit modification or minor modification, and continued compliance is anticipated.

Existing PSD Avoidance Condition

When the VOC BACT limits for the kilns were added under Air Permit No. 03469T15, Jordan Lumber also accepted avoidance conditions for a major PSD modification for PM, PM_{10}, NOx, and CO. The avoidance limits represented the then actual baseline emissions (from June 2003 through May 2005) plus the PSD significance levels for each respective pollutant. The table below summarizes the PSD avoidance limits. The preliminary BACT determination for Jordan Lumber provides more details about the development of these avoidance limits.[3] No changes are required under the "Part 2" permit modification or the minor modification.

Table 8 – Avoidance Limit for PM, PM_{10}, NOx, and CO

Pollutants	Planer Emissions (Tons/year)	Kiln Emissions (Tons/year)	Wood-fired Boiler Emissions (Tons/year)	Total Facility Emissions (Tons/year)	PSD Significance Level (Tons)	Avoidance Limit (Tons/year)
PM	2.83	1.69	114	119	25	144
PM_{10}	--	1.69	105	106	15	121
NO_X	--	--	68.4	68.4	40	108.4
CO	--	--	187	187	100	287
Notes: The baseline emissions were determined from actual baseline amounts from June 2003 through May 2005.						

02D .0530(u) Permit Condition

As discussed previously in Sections 5 and 6, neither the modification to convert the kiln to a direct, natural gas-fired, continuous lumber drying kiln nor the modification to add a wood-fired gasification system was a major modification under PSD. Jordan Lumber relied on PAE emissions for both modifications, and as such, the recordkeeping and reporting requirements of 15A NCAC 2D .0530(u) will be included in the revised air permit. For the purpose of 02D .0530(u), the two projects to modify kiln 7 were considered contemporaneous and the maximum PAE from the modifications, as shown in the Table 9 below, will be included in the permit for tracking purposes. Because the modification to convert to Kiln 7 did result in an increase in capacity, the recordkeeping and reporting requirements will be effective for a period of 10 calendar years following the resumption of operations after the modification is completed. The Permit condition for 15A NCAC 02D .0530(u) is provided in Attachment 3.

[3] William Willets (September 27, 2005).

Table 9 – PAE Emissions under 02D .0530(u)

Pollutant	PAE from Kiln 7 after Modification (tpy)		
	Emissions from Direct, Natural Gas-Fired Kiln	Emissions from Direct, Wood-fired "Gasifier" Kiln	Maximum
Total PM	3.93	3.15	3.93
PM10			
PM2.5			
SO_2	0.06	3.3	3.3
NO_x	10.3	36.0	36.0
CO	8.7	78.8	78.8
VOC	98.3	97.7	98.3

Notes:
- See Table 1 above for calculation of PAE for conversion to direct, natural gas-fired kiln.
- See Table 7 above for calculation of PAE for emissions from direct, wood-fired "Gasifier" Kiln.

112(r)

The facility is not subject to Section 112(r) of the Clean Air Act requirements because it does not store any of the regulated substances in quantities above the thresholds in 112(r). The "Part 2" modification and minor modification do not affect the 112(r) status of the facility.

CAM

CAM is not applicable to Jordan Lumber because potential, pre-controlled PM_{10} emissions from the boilers and planer/wood hog are less than the CAM threshold, as calculated per DAQ spreadsheets. The "Part 2" modification and minor modification do not affect the CAM status of the facility, and continued compliance is anticipated.

Increment Tracking

Montgomery County has been triggered for increment tracking under PSD for PM10 and NO_x. Emissions of PM10 and NOx will increase as a result of converting kiln 7 to a direct gasified wood-fired/natural gas-fired continuous lumber kiln as shown in Table 9 above. Increase in PM10 emissions is estimated as 0.90 lb/hr (3.93 tpy) and increase in NOX emissions is estimated at 8.2 lb/hr (36.0 tpy). A statement regarding the increase for the purpose of increment tracking will be added to the permit cover letter. Note the statement addressing increase in emissions was inadvertently omitted under the "Part 1" permit application.

9. Facility Wide Air Toxics

Permitted emission rates for the kilns (ID Nos. K-1 through K-8) under 15A NCAC 02D .1100 were removed under Air Permit No. 03469T23 issued on March 7, 2016. The associated permit review contains the discussion and rational for removing the permitted emission rates.[4]

As discussed previously in Sections 5 and 6, neither the modification to convert the kiln to direct, natural gas-fired, continuous lumber drying kiln nor the modification to add a wood-fired gasification system posed an unacceptable risk to human health. No additional action is required with respect to NC air toxics for these modifications, and no changes to the permit are necessary.

[4] Betty Gatano (March 7, 2016).

10. Facility Emissions Review

Potential emissions after the modification of kiln 7 (ID No. K-7) are provided in below in Table 10. Actual emissions from Jordan Lumber are reported in the header of this permit review.

Table 10 – Potential Emissions

Pollutant	TV Potential Emissions (tons/yr)
PM (TSP)	71.1
PM10	54.3
PM2.5	33.3
CO	5.93
NO_x	58.5
SO_2	147
VOC	619

Notes:
Emission calculations were provided in the "Part 1" application submitted on April 18, 2016. Additional information for calculation of the emissions was provided in subsequent e-mails from the consultant for the "Part 1" permit application.

11. Compliance Status

Greg Reeves of the FRO conducted the most recent inspection on May 31, 2017. The facility was observed to be in apparent compliance during the inspection. Additionally, a signed Title V Compliance Certification (Form E5) indicating the facility was in compliance with all applicable requirements was included with the application for permit modification.

The five-year compliance history for Jordan Lumber is provided below:

- A Notice of Deficiency (NOD) was submitted on June 15, 2012 for excess visible emission from several boilers.
- A Notice of Violation (NOV) was issued on September 29, 2014 for late notification of stack testing.
- A NOV was issued on December 17, 2014 for late submittal of stack testing results for testing of boilers (ID Nos. B02 and B04).
- A NOV was issued on May 6, 2015 for late submittal of a Notice of Compliance Statement following the completion of the final required performance testing on the boilers, which occurred on November 17, 2014.
- A Notice of Violation/Notice of Recommendation for Enforcement (NOV/NRE) was issued on September 28, 2015 for failure to submit a "Part 2" permit application within 12 months of startup of boiler (ID No. B05). A civil penalty in the amount of $5,252, including costs, was assessed on December 3, 2015. The penalty was paid in full on December 10, 2015.
- A NOV was issued on April 21, 2016 for failure to conduct required annual internal inspection of multicyclone (ID No. C01) and for failure to conduct the periodic tune-up on a boiler (ID No. B05). The violations were discovered during the annual compliance inspection on April 13, 2016.
- A NOV/NRE was issued on May 16, 2016 for failing to conduct a source test for the Case-by-Case MACT within the time-frame required by Air Permit No. 03469T23. A civil penalty in the

amount of $4,214, including costs, was assessed on July 29, 2016. The civil penalty was paid in full on August 24, 2016.

- A NOV was issued on June 27, 2016 for a late initial Notice of Compliance Status for boiler 4 (ID No. B04) for late compliance testing.
- A NOV was issued on September 16, 2016 for late submittal of test report.
- A NOV/NRE was issued on December 2, 2016 for late notification and reporting and deficient recordkeeping for violations observed during the November 29, 2016 compliance inspection. A civil penalty in the amount of $5,753, including costs, was assessed on March 16, 2017. The civil penalty was paid in full on April 25, 2017.
- A NOV was issued on March 3, 2017 for late submittal of 2016 boiler MACT DDDDD annual compliance report for boiler 5 (ID No. B05).
- A NOV/NRE was issued on March 21, 2017 for late submittal of 2016 Title V annual compliance certification (ACC) report. An enforcement action for this NOV/NRE is pending receipt of the company response to the NOV/NRE letter.

All noncompliance issues have been resolved.

12. Public Notice/EPA and Affected State(s) Review

A notice of the DRAFT Title V Permit shall be made pursuant to 15A NCAC 02Q .0521. The notice will provide for a 30-day comment period, with an opportunity for a public hearing. Consistent with 15A NCAC 02Q .0525, the EPA will have a concurrent 45-day review period. Copies of the public notice shall be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 02Q .0522, a copy of each permit application, each proposed permit and each final permit pursuant shall be provided to EPA. Also pursuant to 02Q .0522, a notice of the DRAFT Title V Permit shall be provided to each affected State at or before the time notice provided to the public under 02Q .0521 above. South Carolina and Mecklenburg County Air Quality are within 50 miles of the facility.

13. Other Regulatory Considerations

- A P.E. seal is NOT required for these applications.
- A zoning consistency is not required with the "Part 2" application but was included with the "Part 1" application (No. 6200015.16B), as required. The minor modification required a zoning consistency determination, and it was included with the permit application (No. 6200015.17B).
- A permit fee of $929 was required for both modifications and was submitted with the permit applications.

14. Recommendations

The permit application for Jordan Lumber & Supply Co in Mt. Gilead, Montgomery County, NC has been reviewed by DAQ to determine compliance with all procedures and requirements. DAQ has determined that this facility is complying or will achieve compliance, as specified in the permit, with all requirements that are applicable to the affected sources. The DAQ recommends the issuance of Air Permit No. 03469T25.

Attachment 1

Determining Potential Emissions Associated with Modification and Baseline Actual Emissions

Potential Emissions from Wood Drying in Kiln after Modification		
Projected Throughput for Kiln K-7 after Modification	45,000,000	bf/yr
VOC Emission Factor	4.34	lb/1000 Bf for direct gasifier[1]
VOC Emissions	195,300	lb/yr
	97.65	ton/yr
PM Emission Factor	0.00014	lb/1000 Bf for direct gasifier[1]
PM Emissions	6,300	lb/yr
	3.15	ton/yr

Potential Emissions from Natural Gas Combustion after Modification		
Pollutant	tons/yr	Reference
PM (Total)	0.78	Emissions from natural gas combustion were based on DAQ's "Natural Gas Combustion Emissions Calculator Revision M" (06/22/2015), a maximum heat input of 24 million Btu/hr, and 8,760 hours of operation.
PM (Condensable)	0.59	
PM (Filterable)	0.20	
Sulfur dioxide	0.06	
Nitrogen oxides	10.31	
Carbon monoxide	8.66	
Volatile Organic Compounds	0.57	

Baseline Actual Emissions for Kiln K-7		
Actual Throughput for Kiln K-7		
CY 2012	23,653,389	bf/yr
CY 2013	28,000,742	bf/yr
CY 2014	29,677,310	bf/yr
Average Throughput 2014-2013	28,839,026	bf/yr
VOC Emission Factor	4.09	lb/1000 Bf for steam-heated kilns[1]
VOC Emissions	117,952	lb/yr
	59.0	ton/yr
PM Emission Factor	0.000022	lb/1000 Bf for steam-heated kilns[1]
PM Emissions	634	lb/yr
	0.32	ton/yr

1. Emission factors from DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007)

Attachment 2

Calculating Actual Emissions Associated with Kiln 7 (ID No. K-7) for 2013 and 2014

Step 1 - Estimate Heat Input from Boilers Attributable to Operation of Kiln 7

2014 Data							
Drying Factor @ Steam =	Heat Gen @ Boilers	=	584,563	mmBTU/Yr	=	**0.0032829**	mmBTU
(across all boilers)	Lumber Dried @ Steam		178,063,858	BF/Yr			BF
Actual Board Feet in Kiln 7 =	**29,677,310**	BF/yr					
Heat Input =	Throughput (bf/yr) * drying factor (mmBtu/BF) *one year/8,760 hrs						
Heat Input =	**11.1**	**mm Btu/hr**					

2013 Data							
Drying Factor @ Steam =	Heat Gen @ Boilers	=	717,441	mmBTU/Yr	=	**0.0042704**	mmBTU
	Lumber Dried @ Steam		168,004,454	BF/Yr			BF
Actual Board Feet in Kiln 7 =	**28,000,742**	BF/yr					
Heat Input =	Throughput (bf/yr) * drying factor (mmBtu/BF) *one year/8,760 hrs						
Heat Input =	**13.6**	**mm Btu/hr**					

Step 2 - Calculate Emissions from Boilers Attributable to Operation of Kiln 7

Use estimated heat input calculated from Step 1 as the "maximum heat input" in the DAQ's "Woodwaste Combustion Emissions Calculator" (07/15/2011) for 2013 and 2014 to estimate TAP emissions.

Step 3 - Calculate Emissions from Kiln 7

Use actual board feet dried in Kiln 7 in 2013 and 2014 in DAQ's "Wood Kiln Emissions Calculator Revision C" (July 2007) to estimate TAP emissions. The actual board feet are provided below:

Actual Throughput for Kiln K-7		
CY 2014	29,677,310	bf/yr
CY 2013	28,000,742	bf/yr

Step 4 - Calculate Total Emissions by Summing TAP Emissions from Wood-fired Boilers (Step 2) with TAP Emissions from Kiln K-7 (Step 3)

Pollutant	2014 Emissions (lb/yr)			2013 Emissions (lb/yr)			Actual Emissions (i.e., Max Total) (lb/yr)
	Emissions from Wood-fired Boilers	Kiln K-7	Total	Emissions from Wood-fired Boilers	Kiln K-7	Total	
Acetaldehyde	80.8	1543.0	1623.8	99.3	1456.0	1555.3	1623.8
Acrolein	388.9	223.0	611.9	478.3	210.0	688.3	688.3
Benzene	408.4		408.4	502.3		502.3	502.3
Benzo(a)pyrene	0.1		0.1	0.3		0.3	0.3
Formaldehyde	427.8	543.0	970.8	526.1	512.0	1038.1	1038.1
Phenol	5.0	297.0	302.0	6.1	280.0	286.1	302.0
Toluene	89.5		89.5	110.0		110.0	110.0

Years 2013 and 2014 were used in determining the Baseline Actual Emissions for PSD. The same years are used to calculate TAP emissions for consistency.

Attachment 3

Permit Condition for 15A NCAC 02D .0530(u)

5. 15A NCAC 2D .0530(u): PREVENTION OF SIGNIFICANT DETERIORATION

a. The Permittee has used projected actual emissions to avoid applicability of prevention of significant deterioration requirements for the project to convert kiln 7 **(ID No. K-7)** to a direct wood-fired gasifier/ natural gas-fired continuous lumber kiln as specified in Air Permit Application Nos. 6200015.16B and 6200015.17B.

In order to verify the assumptions used in the projected actual emissions calculations, the Permittee shall comply with the record keeping and reporting requirements in Section 2.1 D.5.b and c below.

Recordkeeping [15A NCAC 2Q .0508(f)]

b. The Permittee shall maintain records of actual emissions for PM, PM_{10}, $PM_{2.5}$, NOx, SO_2, CO, and VOC in tons per year on a calendar year basis for ten years following the resumption of regular operations after the conversion of kiln 7 (ID No. K-7). The Permittee shall make the information, documented and maintained in this available to the Director or the general public pursuant to the requirements in 40 CFR 70.4(b)(3)(viii).

Reporting [15A NCAC 2Q .0508(f)]

c. The Permittee shall submit a report for PM, PM_{10}, $PM_{2.5}$, NOx, SO_2, CO, and VOC emissions to the Director within 60 days after the end of each calendar year during which the records in Section 2.1 D.5.b. must be generated. The report shall contain the items listed in 40 CFR 51.166(r)(6)(v)(a) through (c).

The reported actual emissions for each of the ten calendar years for PM, PM_{10}, $PM_{2.5}$, NOx, SO_2, CO, and VOC will be compared to the respective projected actual emissions as included below:

Pollutant	Projected Actual Emissions* (Tons per Year)
$PM/PM_{10}/PM_{2.5}$	3.93
NOx	36.0
SO_2	3.3
CO	78.8
VOC	98.3

* The projected actual emissions are not enforceable limitations. If the reported actual emissions exceed the projected actual emissions, the Permittee shall include in its annual report an explanation as to why actual emissions exceeded the projected actual emissions.